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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
RYMAN, DANIEL J	

ART UNIT	PAPER NUMBER
2665	

DATE MAILED: 08/05/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/655,295	CHERITON, DAVID R.	
	Examiner	Art Unit	
	Daniel J. Ryman	2665	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 July 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *16,19-26,28-30 and 32-49* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *16,19-26,28-30 and 32-49* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed 7/15/2005 have been fully considered but they are not persuasive. Applicant asserts, with respect to all pending claims, that Venkatachary does not disclose that each node stores values for an opcode, wherein the opcode specifies: a particular field of a plurality of fields in the header of the data packet; and an operation that is to be performed on the data stored in the particular field. Examiner, respectfully, disagrees.

2. In Venkatachary, each node specifies a field in the header of the packet, i.e. a source or destination address, since each node is directed to a specific field in the header (col. 9, line 59-col. 10, line 33). In addition, Venkatachary discloses that, in each node, the specified field is compared to a value stored in the node in order to determine if a lowest cost match for a filter has been found (col. 9, line 59-col. 10, line 33). This comparison is "an operation that is to be performed on the data stored in the particular field."

3. In view of the foregoing, Examiner maintains that the cited prior art renders the claims obvious.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 16, 19-20, 28-30, 32, 33, 40, and 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Venkatachary et al. (USPN 6,212,184) in view of Douceur et al. (USPN 6,041,053).

6. Regarding claims 16 and 28-30, Venkatachary discloses a method for routing or switching data packets, comprising the computer-implemented steps of: receiving a data packet at an input interface on a router or switch (col. 9, line59-col. 10, line 5); looking up information in the header of said data packet in an expanded M-trie data structure (col. 5, lines 16-65 and col. 14, lines 42-55), wherein said expanded M-trie data structure is organized as a multi-level tree including a root node, inferior nodes, and terminal nodes (Figs 11 and 12 and col. 14, lines 31-33) wherein each node stores values for an opcode, wherein said opcode specifies: a particular field of a plurality of fields in the header of said data packet (col. 9, line 59-col. 10, line 33) where each trie acts on a particular field in a header; and an operation that is to be performed on the data stored in that particular field (comparison of field to the value of the trie in order to determine if a lowest cost match for a filter has been found) (col. 10, lines 6-18; col. 14, lines 37-40; and col. 16, lines 10-33); and terminating said step of looking up information (col. 8, lines 17-37, esp. col. 8, lines 30-37 and col. 10, lines 6-33).

Venkatachary does not expressly disclose that each node includes an address. However, Venkatachary does disclose that the nodes are arranged in a tree, which is searched for a longest-matching sequence (col. 15, lines 10-17). Doucer teaches, in a trie system, that each node contains an address in order to allow the node to point to the next branch in the tree (col. 18, lines 24-32) where in Venkatachary the address would point to the next node in the tree. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to have

each node include an address in order to allow the node to be situated in a tree structure where the address points to the next node in the tree.

7. Regarding claims 19 and 32, Venkatachary in view of Doucer discloses that the address includes the address of a node in said expanded M-trie data structure that is to be traversed (Doucer: col. 18, lines 24-32).

8. Regarding claims 20 and 33, Venkatachary in view of Doucer does not expressly disclose that the expanded M-trie data structure includes a set of access control parameters. However, Venkatachary in view of Doucer does disclose that the trie can be based on any field in the packet (Venkatachary: col. 5, lines 60-62 and col. 14, lines 47-49) in order to provide differential service (Venkatachary: col. 5, lines 42-45). Venkatachary in view of Doucer also discloses that type of service, i.e. protocol classifier (access control parameter), is a known field (Venkatachary: col. 5, lines 47-56). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to include, in the expanded M-trie data structure, a set of access control parameters in order to provide differential service.

9. Regarding claims 40 and 45, Venkatachary in view of Doucer discloses routing said data packet at one or more output interfaces on said router or said switch (Venkatachary: col. 9, line59-col. 10, line 18).

10. Claims 21, 22, 34, and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Venkatachary et al. (USPN 6,212,184) in view of Douceur et al. (USPN 6,041,053) as applied to claims 16, and 30 above, and further in view of Chiu et al. (USPN 6,385,170).

11. Regarding claims 21 and 34, Venkatachary in view of Doucer does not expressly disclose that said expanded M-trie data structure includes a set of Quality of Service (QoS) parameters;

however, Venkatachary in view of Doucer does disclose that the trie data structure can be based on any set of fields in order to provide differential service (Venkatachary: col. 5, lines 42-45; col. 5, lines 60-62; and col. 14, lines 47-49). Venkatachary in view of Doucer also discloses that the router can operate on the ToS field of an IP packet (Venkatachary: col. 5, lines 47-56). Chiu teaches as prior art, in a routing system, that "[i]n order to support increasing demands for real-time and multimedia applications as well as mission critical applications, Internet Protocol (IP) need to support quality of service (QoS)" (col. 1, lines 15-19). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have the expanded M-trie data structure include a set of Quality of Service (QoS) parameters in order to support increasing demands for real-time and multimedia applications as well as mission critical applications.

12. Regarding claims 22 and 35, Venkatachary in view of Doucer does not expressly disclose that said expanded M-trie data structure includes a set of Class of Service (CoS) parameters; however, Venkatachary in view of Doucer does disclose that the trie data structure can be based on any set of fields in order to provide differential service (Venkatachary: col. 5, lines 42-45; col. 5, lines 60-62; and col. 14, lines 47-49). Venkatachary in view of Doucer also discloses that the router can operate on the ToS field of an IP packet (Venkatachary: col. 5, lines 47-56). Chiu teaches as prior art, in a routing system, that "[i]n order to support increasing demands for real-time and multimedia applications as well as mission critical applications, Internet Protocol (IP) need to support quality of service (QoS)" (col. 1, lines 15-19). Chiu also discloses that "[i]n order to avoid the scalability problem with flow-based QoS, class-based QoS, which is also referred to as Class of Service (CoS), is proposed to provide differentiated service for each class" (col. 1, lines 52-55). Therefore, it would have been obvious to one of ordinary skill in the art at

the time of the invention to have the expanded M-trie data structure include a set of Class of Service (CoS) parameters in order to support increasing demands for real-time and multimedia applications as well as mission critical applications while avoiding the scalability problems of flow-based QoS.

13. Claims 23, 24, 26, 36, 37, and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Venkatachary et al. (USPN 6,212,184) in view of Douceur et al. (USPN 6,041,053) as applied to claims 16 and 30 above, and further in view of Onishi et al. (USPN 5,434,863).

14. Regarding claims 23 and 36, Venkatachary in view of Doucer discloses that said nodes include opcodes for demultiplexing (Venkatachary: col. 9, lines 59-col. 10, line 5), where the instructions in the opcode have the trie place packets from a single input link onto different output links depending on the packet's header, and opcodes for matching (Venkatachary: col. 10, lines 6-24), where the opcodes specify fields in the packet (destination, source) to be used for matching in the trie.

Venkatachary in view of Doucer does not expressly disclose that the nodes include opcodes for hashing; however, Venkatachary in view of Doucer does disclose that the trie data structure contains instructions (opcode) for arbitrarily defining which portions of the header should be examined in a router (Venkatachary: col. 9, line 59-col. 10, line 5 and Doucer: col. 9, line 41-col. 10, line 22). Venkatachary in view of Doucer also discloses that the trie enters into different branches in the trie structure depending on the portion of the header examined (Venkatachary: col. 9, line 59-col. 10, line 33). Ohishi teaches, in a routing system, implementing a routing (forwarding) table using a hash function, where the hash function

projects a certain amount of data onto a smaller amount of data and then uses pointers to find routing information for a packet, in order to perform high speed retrieval (col. 8, lines 14-32). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to the nodes include opcodes for hashing in order to perform high-speed retrieval.

15. Regarding claim 24 and 37, Venkatachary in view of Doucer in further view of Ohishi discloses that said opcodes for demultiplexing include instructions to demultiplex into branches of said expanded M-trie data structure based on contents of one or more bytes included in a packet header that is being read (Venkatachary: col. 9, lines 59-col. 10, line 5), where the instructions in the opcode have the trie follow different paths depending on the contents of the header.

16. Regarding claims 26 and 39, Venkatachary in view of Doucer in further view of Ohishi discloses that said opcodes for hashing include instructions to hash into different branches of the expanded M-trie data structure based on contents of a given set of byte in said packet header (Venkatachary: col. 9, lines 59-col. 10, line 5 and Ohishi: col. 8, lines 14-32).

17. Claims 25 and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Venkatachary et al. (USPN 6,212,184) in view of Douceur et al. (USPN 6,041,053) in further view of Onishi et al. (USPN 5,434,863) as applied to claims 10, 23, and 36 above, and further in view of Chiu et al. (USPN 6,385,170).

18. Regarding claims 25 and 38, Venkatachary in view of Doucer in further view of Ohishi discloses that said opcodes for matching include instructions to compare contents of a byte in the header to given node data (Venkatachary: col. 9, line 59-col. 10, line 24 and Doucer: col. 9, line 41-col. 10, line 22). Venkatachary in view of Doucer in further view of Ohishi does not

expressly disclose that that said opcodes for matching include instructions to compare contents of a byte in the flow label to given node data. Chiu teaches as prior art, in a routing system, that "[a]n IP flow is defined as a set of packets matching a particular profile" where IP packets are handled according to flow (col. 1, lines 15-41). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have the opcodes for matching include instructions to compare contents of a byte in the header to given node data in order to allow an IP packet to be handled according to its flow.

19. Claims 41-44 and 46-49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Venkatachary et al. (USPN 6,212,184) in view of Douceur et al. (USPN 6,041,053) as applied to claims 16 and 29 above, and further in view of Wilford et al. (USPN 5,509,006).

20. Regarding claims 41 and 46, Venkatachary in view of Doucer does not expressly disclose determining, based on one or more Access Control List (ACL) criteria stored in said expanded M-trie data structure, whether to drop or forward said data packet. However, Venkatachary in view of Doucer does disclose determining, based on criteria stored in the trie data structure, whether to drop or forward a data packet in order to provide differentiated services (Ventachary: col. 5, lines 16-56 and col. 8, lines 30-37). Wilson teaches, in a switching system using a tree memory, that an ACL "tells the [router] which devices are allowed to transmit messages to destinations on particular networks." Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to determine, based on one or more Access Control List (ACL) criteria stored in said expanded M-trie data structure, whether to drop or forward said data packet since this provides differentiated services.

21. Regarding claims 42 and 47, Venkatachary in view of Doucer in view of Wilford discloses that determining whether to drop or forward said data packet comprises matching said information in the header of said data packet to the one or more ACL criteria stored in said expanded M-trie data structure (Ventachary: col. 5, lines 16-56 and col. 8, lines 30-37).

22. Regarding claims 43 and 48, Venkatachary in view of Doucer in view of Wilford discloses that the one or more ACL criteria include at least one of a source address, destination address, and upper-layer protocol information (Ventachary: col. 5, lines 16-56 and col. 8, lines 30-37).

23. Regarding claims 44 and 49, Venkatachary in view of Doucer in view of Wilford discloses that the one or more ACL criteria are stored in a sub-tree of said expanded M-trie data structure (Ventachary: col. 5, lines 16-56 and col. 8, lines 30-37).

Conclusion

24. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daniel J. Ryman whose telephone number is (571)272-3152. The examiner can normally be reached on Mon.-Fri. 7:00-4:30 with every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Huy Vu can be reached on (571)272-3155. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Daniel J. Ryman
Examiner
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